

## **Claims**

What is claimed is:

1. A toner layer regulating system for an electrophotographic image forming apparatus, comprising:

5 a toner carrier;

a toner regulating member supported in cantilevered fashion against said toner carrier so as to form a toner nip therebetween; said toner regulating member comprising a flexible metallic substrate having a first surface disposed toward said toner carrier and a coating covering at least an area of  
10 said first surface forming said nip;

wherein said coating comprises a matrix of a base polymer and a plurality of fine particles, said fine particles having a particle size of 0.1 microns to thirty microns; wherein said coating has a thickness of approximately one  
hundred fifty microns or less;

15 wherein said coating has a surface roughness in the range of 0.15 to 1.5 microns Ra and in the range of 1 to 15 microns Rz.

2. The toner regulating system of claim 1 wherein said fine particles are selected from the group consisting of silicon dioxide, titanium dioxide, cerium oxide, silicon carbide, aluminum oxide, titanium diboride, diamond, borosilicate glass, soda glass,  
20 enameled glass, polyurethane beads, polyacrylate beads, and silicone beads.

3. The toner regulating system of claim 2 wherein said coating has a dry concentration of said fine particles of between about 1% and about 50% of said coating on a weight basis.

4. The toner regulating system of claim 3 wherein said coating is formed from a mixture having a wet concentration of said fine particles of between about 1% and about 25% on a weight basis.

5. The toner regulating system of claim 1 wherein said base polymer is selected from a group consisting of polyurethane, polyester, polyamide, epoxides, phenolics, polyimides, and combinations thereof.

6. The toner regulating system of claim 1 wherein said coating further comprises a conductive additive selected from the group consisting of an ionic salt, carbon nanotubes, carbon black, polyanilines, and metallic particles.

7. The toner regulating system of claim 1 wherein said toner regulating member further comprises a carrier stratum disposed between said coating and said substrate.

8. The toner regulating system of claim 7 wherein said carrier stratum adhesively secures to said substrate.

9. The toner regulating member of claim 7 wherein said toner regulating member further comprises a conductive caulk electrically connecting said coating to said substrate.

10. The toner regulating system of claim 1 wherein said coating has a thickness of twenty-five microns or less.

11. The toner regulating system of claim 1 wherein substantially all of said fine particles in said coating have a particle size of 0.5 microns to ten microns.

5 12. The toner regulating member of claim 1 wherein said coating has an electrical resistivity of  $\leq 10^9$  Ohm-cm.

13. The toner regulating system of claim 1 wherein said coating comprises a plurality of layers including an outer layer and a second layer disposed between said outer layer and said substrate, wherein said fine particles are present in at least one of  
10 said outer and said second layers.

14. The toner regulating system of claim 13 wherein said fine particles are present in not more than one of said outer and said second layers.

15. The toner regulating system of claim 1:

wherein said base polymer is selected from a group consisting of

polyurethane, polyester, polyamide, epoxides, phenolics, polyimides, and combinations thereof;

5 wherein said fine particles are selected from the group consisting of silicon

dioxide, titanium dioxide, cerium oxide, silicon carbide, aluminum oxide,

titanium diboride, diamond, borosilicate glass, soda glass, enameled glass,

polyurethane beads, polyacrylate beads, and silicone beads;

wherein said coating has a dry concentration of said fine particles of between

10 about 10% and about 50% of said coating on a weight basis;

wherein said coating is formed from a mixture having a wet concentration of

said fine particles of between about 5% and about 25% on a weight basis;

and

wherein said coating has an electrical resistivity of  $\leq 10^9$  Ohm-cm.

16. A toner cartridge, comprising:

a housing;

a toner carrier rotatably supported by said housing;

a toner regulating member disposed proximate said toner carrier and

5 supported in cantilevered fashion against said toner carrier so as to form a

toner nip therebetween; said toner regulating member comprising a flexible

metallic substrate having a first surface disposed toward said toner carrier

and a coating covering at least an area of said first surface forming said nip;

wherein said coating comprises a matrix of a base polymer resin and a

10 plurality of fine particles having a particle size of 0.1 microns to thirty

microns; wherein said coating has a thickness of approximately one

hundred fifty microns or less; and

wherein said coating has a surface roughness in the range of 0.15 to 1.5

microns Ra and in the range of 1 to 15 microns Rz.

15 17. The toner cartridge of claim 16 wherein said fine particles are selected from the group consisting of silicon dioxide, titanium dioxide, cerium oxide, silicon carbide, aluminum oxide, titanium diboride, diamond, borosilicate glass, soda glass, enameled glass, polyurethane beads, polyacrylate beads, and silicone beads.

18. The toner cartridge of claim 17 wherein said coating has a dry concentration of  
20 said fine particles of between about 1% and about 50% of said coating on a weight basis.

19. The toner cartridge of claim 18 wherein said coating is formed from a mixture having a wet concentration of said fine particles of between about 1% and about 25% on a weight basis.

20. The toner cartridge of claim 16 wherein said base polymer is selected from a group consisting of polyurethane, polyester, polyamide, epoxides, phenolics, polyimides, and combinations thereof.

21. The toner cartridge of claim 16 wherein said coating further comprises a conductive additive selected from the group consisting of an ionic salt, carbon nanotubes, carbon black, polyanilines, and metallic particles.

22. The toner cartridge of claim 16 wherein said toner regulating member further comprises a carrier stratum disposed between said coating and said substrate.

23. The toner cartridge of claim 22 wherein said carrier stratum adhesively secures to said substrate.

24. The toner cartridge of claim 22 wherein said toner regulating member further comprises a conductive caulk electrically connecting said coating to said substrate.

25. The toner cartridge of claim 16 wherein said coating has a thickness of twenty-five microns or less.

26. The toner cartridge of claim 16 wherein substantially all of said fine particles in said coating have a particle size of 0.5 microns to ten microns.

27. The toner cartridge of claim 16 wherein said coating has an electrical resistivity of  $\leq 10^9$  Ohm-cm.

28. The toner cartridge of claim 16 wherein said coating comprises a plurality of layers including an outer layer and a second layer disposed between said outer layer and said substrate, wherein said fine particles are present in at least one of said outer and said second layers.

29. The toner cartridge of claim 28 wherein said fine particles are present in not more than one of said outer and said second layers.

30. The toner cartridge of claim 16:

wherein said base polymer is selected from a group consisting of polyurethane, polyester, polyamide, epoxides, phenolics, polyimides, and combinations thereof;

wherein said fine particles are selected from the group consisting of silicon dioxide, titanium dioxide, cerium oxide, silicon carbide, aluminum oxide, titanium diboride, diamond, borosilicate glass, soda glass, enameled glass, polyurethane beads, polyacrylate beads, and silicone beads; substantially all of said fine particles in said coating having a particle size of 0.5 microns to ten microns;

wherein said mixture has a dry concentration of said fine particles of between about 10% and about 50% of said coating on a weight basis; and

wherein said coating is formed from a mixture having a wet concentration of  
said fine particles of between about 5% and about 25% on a weight basis;  
and

wherein said coating has an electrical resistivity of  $\leq 10^9$  Ohm-cm.



31. An image forming device, comprising:

a supply source for media;

at least one toner cartridge supplying a toner image for transfer to said media,  
said toner cartridge comprising:

5 a housing;

a toner carrier rotatably supported by said housing;

a toner regulating member disposed proximate said toner carrier and  
supported in cantilevered fashion against said toner carrier so as to form  
a toner nip therebetween; said toner regulating member comprising a  
flexible metallic substrate having a first surface disposed toward said  
10 toner carrier and a coating covering at least an area of said first surface  
forming said nip;

wherein said coating comprises at least matrix of a base polymer resin  
and a plurality of fine particles having a particle size of 0.1 microns to  
thirty microns; wherein said coating has a thickness of approximately  
15 one hundred fifty microns or less; and

wherein said coating has a surface roughness in the range of 0.15 to 1.5  
microns Ra and in the range of 1 to 15 microns Rz.

32. The image forming device of claim 31 wherein said fine particles are selected

20 from the group consisting of silicon dioxide, titanium dioxide, cerium oxide, silicon  
carbide, aluminum oxide, titanium diboride, diamond, borosilicate glass, soda glass,  
enameled glass, polyurethane beads, polyacrylate beads, and silicone beads.

33. The image forming device of claim 32 wherein said coating has a dry concentration of said fine particles of between about 1% and about 50% of said coating on a weight basis.

34. The image forming device of claim 33 wherein said coating is formed from a mixture having a wet concentration of said fine particles of between about 1% and about 25% on a weight basis.

35. The image forming device of claim 31 wherein said base polymer is selected from a group consisting of polyurethane, polyester, polyamide, epoxides, phenolics, polyimides, and combinations thereof.

36. The image forming device of claim 31 wherein said coating further comprises a conductive additive selected from the group consisting of an ionic salt, carbon nanotubes, carbon black, polyanilines, and metallic particles.

37. The image forming device of claim 31 wherein said toner regulating member further comprises a carrier stratum disposed between said coating and said substrate.

38. The image forming device of claim 37 wherein said carrier stratum adhesively secures to said substrate.

39. The image forming device of claim 37 wherein said toner regulating member further comprises a conductive caulk electrically connecting said coating to said substrate.

40. The image forming device of claim 31 wherein said coating has a thickness of twenty-five microns or less.

41. The image forming device of claim 31 wherein substantially all of said fine particles in said coating have a particle size of 0.5 microns to ten microns.

5 42. The image forming device of claim 31 wherein said coating has an electrical resistivity of  $\leq 10^9$  Ohm-cm.

43. The image forming device of claim 31 wherein said coating comprises a plurality of layers including an outer layer and a second layer disposed between said outer layer and said substrate, wherein said fine particles are present in at least one of  
10 said outer and said second layers.

44. The image forming device of claim 43 wherein said fine particles are present in not more than one of said outer and said second layers.

45. The image forming device of claim 31:

wherein said base polymer is selected from a group consisting of  
polyurethane, polyester, polyamide, epoxides, phenolics, polyimides, and  
combinations thereof;

5 wherein said fine particles are selected from the group consisting of silicon  
dioxide, titanium dioxide, cerium oxide, silicon carbide, aluminum oxide,  
titanium diboride, diamond, borosilicate glass, soda glass, enameled glass,  
polyurethane beads, polyacrylate beads, and silicone beads; substantially  
all of said fine particles in said coating having a particle size of 0.5 microns  
10 to ten microns;

wherein said mixture has a dry concentration of said fine particles of between  
about 10% and about 50% of said coating on a weight basis; and

wherein said coating is formed from a mixture having a wet concentration of  
said fine particles of between about 5% and about 25% on a weight basis;

15 and

wherein said coating has an electrical resistivity of  $\leq 10^9$  Ohm-cm.